Amend Section 645 to read:

SECTION 645 -- EROSION CONTROL

Description

1.1 Permanent erosion control. This work shall consist of furnishing and placing hay mulch, bark mulch, wood, straw or coconut fiber mat, synthetic mat, paper mat, jute mesh or other material as a soil stabilization product for erosion control on slopes or ditches for protection to hold the ground and/or cover material (sod, seed, etc.) in place, at locations shown on the plans or where ordered.

1.1.1 Slope stabilization (2:1 or flatter) shall be material installed on slopes 2:1 (H:V) or flatter.

1.1.2 Slope stabilization (steeper than 2:1) shall be material installed on slopes steeper than 2:1.

1.1.3 Channel stabilization (low velocity) shall be material installed in channels or ditches with a velocities equal to or less than 2.75 m/s (9 ft/s).

1.1.4 Channel stabilization (high velocity) shall be material installed in channels or ditches with a velocity greater than 2.75 m/s (9 ft/s).

1.1.5 Permanent stabilization shall be permanent material installed on slopes or in channels.

1.2 Temporary erosion control. This work shall consist of furnishing, stockpiling, installing, sowing, maintaining, and removing temporary erosion and sediment control devices at locations shown on the plans, or where ordered. Erosion control devices examples are: temporary seeding, silt fence, hay bales, temporary mulch, and erosion stone.

1.3 Erosion and Sediment Control and Stormwater Management Plan. This work shall consist of the development of a temporary Erosion and Sediment Control and Stormwater Management Plan, hereinafter called the "Plan". The work includes all necessary preparations for submissions and revisions of the Plan to obtain approval by the Department. This work shall also include monitoring the approved Plan during all phases of construction.

1.3.1 The Department will furnish the following data to the Contractor:

- Specific reproducible plan sheets and cross-sections of the project, as requested,
- Drainage calculations and plans (drainage area size and characteristics; runoff volume; type, size, and slope of pipes; invert elevations; and outlet velocities), as available,
- Geotechnical Report including soil boring logs, soil types, and test pit data, as available,
- Permits and certifications obtained for the project, and
- A list of environmental commitments.

- NHDES Wetlands Permit "Plan of Record".

1.3.2 Recommended guides for the preparation of the Plan are the AASHTO Highway Drainage Guideline, Volume III, *Guidelines for Erosion and Sediment Control in Highway Construction*, available from the American Association of State Highway and Transportation Officials, Inc., 444 North Capitol St. N.W., Suite 249, Washington, D.C. 20001; the *Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire* available from the New Hampshire Department of Environmental Services (NHDES) Public Information and Permitting Office, PO Box 95, 6 Hazen Drive, Concord, NH 03302-0095, Telephone (603) 271-2975 and the Rockingham County Conservation District in Exeter, NH, Telephone (603) 772-4385; the NHDOT Guidelines for Temporary Erosion and Sediment Control and Stormwater Management (May 2002).

1.3.3 The Plan shall be consistent with the provisions of 107.01.

Materials

2.1 Hay mulch shall consist of cured hay, free from noxious weeds and rough or woody materials.

2.1.1 Bark mulch shall be bark chippings graded to be approximately 10 to 50 mm (3/8 to 2 in) in width. The chippings shall not have been stored so long and under such conditions that the material has decomposed sufficiently so that it has lost its fibrous texture. Bark mulch must be approved as to grading and condition prior to its use.

2.1.2 Temporary mulches may be hay, straw, fiber mats, netting, wood cellulose, bark, chips or other acceptable material and shall be reasonably clean and free of noxious weeds and materials toxic to plant growth.

2.1.3 Other types of mulch as included on the Qualified Products List may be used.

2.2 Soil stabilization materials of the type specified shall be a product as included on the Qualified Products List. The material furnished for use shall be of sufficient construction and strength to hold the processed ground and/or cover material (sod, seed, etc.) in place until an acceptable growth of natural or planted material is established.

2.3 Staples for soil stabilization material matting shall be those specified by the manufacturer.

2.4 Grass seed for erosion control shall be one of the following:

(a) Seed for temporary control shall be a quick growing species suitable to the area, such as annual or perennial ryegrass, providing a temporary cover which will not compete with the grasses subsequently sown for permanent cover.
(b) Seed for a more permanent control shall be of the type specified in the plans or as set forth in 644.2.3.

2.5 Hay bales for erosion control shall consist of rectangular shaped bales of hay or straw weighing at least 18 kg (40 lb) per bale. They shall be free from noxious weed seeds and rough or woody materials.

2.6 Tackifiers shall be as included on the Qualified Products List.

2.7 Geotextile filter fabric for silt fence shall be made from polypropylene, polyester, or other approved polymeric chemically stable material and be resistant to ultraviolet radiation degradation for at least 12 months. Silt retention capacity shall be no less than 75 percent of silt and suspended solids. The fabric shall meet the following requirements.

Fabric Property	Test Method	Property Requirement*
Grab Tensile Strength (N (lbs))	ASTM D 4632	450 (100) Minimum
Grab Tensile Elongation (%)	ASTM D 4632	25 Maximum
Puncture Strength (N (lbs))	ASTM D 4833	275 (60) Minimum
Mullen Burst Strength (kPa (psi))	ASTM D 3786	1500 (210) Minimum
Trapezoid Tear Strength (N (lbs))	ASTM D 4533	275 (60) Minimum

* All properties are minimum or maximum average roll values (i.e. the test results for any sampled roll in a lot shall meet or exceed the minimum values or be less than or meet the maximum value in the table.)

2.8 Posts for silt fence shall be either wood or steel. Wood posts shall be sound quality hardwood with a minimum cross sectional area of 1,033 square millimeters (1.6 square inches). Steel post shall be standard T or U section weighing not less than 1.5 kilograms per linear meter (1 pound per linear foot) with projections for fastening wire to the fence. Maximum post spacing shall be 3 m (10 ft).

2.9 Support fence for silt fence, if required, shall be a minimum of 1.9 mm (14.5 gauge) woven wire with a maximum 150 mm (6 in) mesh.

2.10 Erosion stone shall meet the requirements for Item 585.4 Class D stone.

Construction Requirements

3.1 General

3.1.1 Prior to the start of construction requiring erosion and sediment control, the Contractor shall submit four sets of the Erosion and Sediment Control and Stormwater Management Plan described in 3.2 for approval in accordance with 105.02 for clearing, grubbing, grading, drainage and bridge structures, especially in or adjacent to existing waters**,** water courses and wetlands. The Department's review time will be proportional to the complexity of the Plan and will be within 15 working days. No work requiring erosion/ sediment control shall commence until the Plan has been approved. Names of designated personnel to perform field monitoring shall be included in the submittal. The Plan may be

submitted in phases or for specific construction areas. Only work within areas covered by an approved Plan will be allowed to be performed.

3.1.1.1 The Department will secure the necessary NHDES Wetlands or US Army Corps of Engineers permit(s) to accomplish the work indicated on the plans. The contractor is responsible for obtaining additional Wetlands or Corps of Engineers permit(s) for the Contractor's method of construction.

3.1.2 Permanent and temporary erosion control features shall be incorporated into the project at the earliest practicable time, as specified on the plans, as stated in 107.01, and as outlined in the approved Plan. Temporary erosion and sediment control measures shall be used to correct conditions that develop during construction to temporarily control erosion not associated with permanent control features.

3.1.3 When erosion is likely to be a problem, grubbing operations shall be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter.

3.1.4 The amount of disturbed earth material exposed shall not exceed a total of 46,450 square meters (500,000 square feet) for all operations within the right-of-way at any one time without prior approval and provided the Contractor's Plan shows adequate provisions to control erosion and sediment. The Erosion Control Plan shall identify when exposed material will be protected from erosion and when temporary and permanent erosion control measures will be installed.

3.1.5 The Engineer will limit the area of grubbing, excavation, borrow and embankment operations commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding and permanent erosion and sediment control measures concurrent with operations in accordance with the accepted plan.

3.1.6 Earth excavation and embankment slopes shall be permanently or temporarily treated for stabilization before the time the slant height of exposed slopes reaches 9 m (30 ft), unless otherwise approved. Where construction activities are completed within the growing season, all exposed soil areas shall be permanently stabilized within 14 calendar days. Where construction activities are temporarily suspended or completed outside the growing season, all exposed soil areas shall be stabilized within 14 calendar days.

3.1.7 As work progresses, patch seeding and mulching shall be done as required on areas previously treated to maintain or establish protective cover.

3.1.8 Drainage pipes and ditches shall be constructed in a sequence from outlet to inlet in order to stabilize outlet areas and ditches before water is directed to the new installation or any portion thereof unless conditions unique to the location warrant an alternative method. If this unique condition exists, the alternate method will require written approval.

3.1.9 Channel and ditch work, including erosion protection shall be completed before diverting the drainage to these areas.

3.1.10 In the event of conflict between these requirements and erosion and sediment control laws, rules or regulations of other Federal, State or local agencies, the more restrictive laws, rules or regulations shall apply.

3.1.11 In case of failure on the part of the Contractor to provide and maintain effective temporary erosion and sediment control, as determined by the Engineer, the Department reserves the right to employ outside assistance or to use its own forces to provide the necessary corrective measures.

3.2 Erosion and Sediment Control and Stormwater Management Plan.

3.2.1 The Plan shall be prepared, stamped and signed by a Licensed Professional Engineer registered in the State of New Hampshire qualified to prepare erosion and sediment control plans, hereinafter called the "Preparer". Collaboration with other professionals such as soil scientists, geologists and environmentalists may be required as appropriate.

3.2.1.1 Qualifications for the Plan Preparer shall include a minimum of 5 years experience or knowledge of highway and bridge construction operations, with knowledge of methods of construction, demonstrated knowledge of erosion and sediment control, and stormwater management measures. The preparer shall have previously submitted accepted plans to the New Hampshire Department of Environmental Services (NHDES) under RSA 485-A: 17 Terrain Alteration, or have prepared accepted plans under the National Pollutant Discharge Elimination System permit program.

3.2.1.2 Qualifications for the Plan Monitor shall include a minimum of 2 years experience or knowledge of highway and bridge construction with knowledge of methods of construction, demonstrated field knowledge of erosion control measures; their design, effectiveness, and maintenance requirements.

3.2.1.3 The Contractor shall submit the name and qualifications of the person(s) or firm proposed to prepare and monitor the Plan for approval prior to preparing the Plan. Submittal of the name and qualifications will be accepted after the opening of bids.

3.2.2 The Plan shall be developed using a combination of structural, non-structural and vegetative Best Management Practices (BMPs) to adequately control erosion and sedimentation and manage stormwater, as recommended in 1.3.2 and in accordance with the Standard Specifications or shown on the project plans. The Plan shall contain a narrative, plan drawings and design calculations, design typicals, and specifications associated with the Contractor's proposed construction phasing.

3.2.2.1 The narrative shall contain site-specific information describing existing site(s) conditions, description of the project, soils, and environmentally sensitive areas. A discussion of the various erosion

and sediment control and stormwater management BMPs, the stabilization methods for temporary measures, a schedule of construction phasing, and a schedule for monitoring and maintaining the plan shall also be included. BMPs for seasonal (i.e. cold weather/frozen ground) applications shall be identified. The construction phasing shall address the various erosion and sediment control and stormwater management measures to be implemented at each phase of construction. Phases shall be as shown on the Traffic Control Plan, Prosecution of Work, or as indicated by the Contractor's approved schedule of operations.

3.2.2.2 Turbidity limitations in receiving waters noted in 107.01 shall be addressed in the Plan

3.2.2.3 Department plan drawings will show the construction site(s) conditions prior to and after construction by including property lines, right-of-way lines, easements, existing and new structures, drainage, flood plains, wetlands, limits of clearing and grading, proposed final drainage, detours, permanent erosion and sediment control measures, and other critical items. The Contractor's plan drawings shall show temporary drainage and erosion and sediment control measures for the construction site(s) on the contract plans provided by the Department. Additionally**,** the Contractor shall provide plans showing all of the above items for proposed areas related to the construction site(s) not shown on the Department's contract plans, including but not limited to, access and haul roads, equipment and material storage sites, material pits, material processing sites, and disposal areas, except municipally authorized landfill areas and commercial sites. Waste materials are quite often materials unsuitable for embankment construction and generally very susceptible to erosion; therefore, the Contractor shall pay close attention to controlling erosion of these materials.

3.2.2.4 Additional design typicals illustrating practices for erosion and sediment control not shown on the Department plans shall be included in the Plan. Calculations shall be included to verify all erosion and sediment control and stormwater management practices such as, but not limited to, sediment retention and detention basins, energy dissipators, diversions, waterways, and control of runoff.

3.2.3 The Preparer or the Preparer's designated representative shall assist the Contractor in implementing the Plan, monitor the site for compliance with the Plan and recommend modifications to the Plan for changing operations or inadequate erosion and sediment control and stormwater management measures. The Preparer shall make modifications to the Plan as necessary and resubmit for review and approval in accordance with 3.1.1. Review time of modifications will be within 10 working days of submittal.

3.2.3.1 Monitoring Erosion and Sediment Control shall include on-site reviews, weekly and within 24 hours after any storm event greater than 13 mm (0.5 in) of rain per 24-hour period. A monitoring report prepared by the Plan Monitor stating the date of review and describing the erosion and sediment control and stormwater management measures reviewed, the effectiveness of their operation, any deficiencies, and corrective actions to be undertaken shall be prepared after each review. A copy shall be provided to the Engineer and maintained on file at the project site.

3.2.3.2 The Engineer may order modifications to the Plan for changing operations or for inadequate erosion and sediment control and stormwater management measures. Changes and/or modifications shall be noted by the Plan Preparer on the approved Plan located at the project site.

3.2.3.3 The Preparer of the Plan shall be available for on-site consultations with the Engineer within 24 hours of request.

3.2.3.4 The Department reserves the right to request a replacement Monitor in accordance with 108.05.

3.2.4 Project work may be suspended, wholly or in part, with no extension of time or additional compensation for failure to implement and maintain the approved Plan, including modifications, in accordance with 105.01.

3.3 Mulch

3.3.1 Mulching shall be done immediately after each area has been properly prepared. When seed for erosion control is sown prior to placing the mulch, the mulch shall be placed on the seeded areas within 48 hours after seeding. Hay that has been thoroughly fluffed shall be applied at approximately, but not to exceed 6.7 metric tons per hectare (3 tons per acre) unless otherwise ordered. Blowing chopped hay mulch will be permitted provided the Contractor controls the mulching operation so as not to infringe on property owners or the traveling public. Hay mulch shall be applied in such a manner that results in a minimum amount of matting that would not retard the vegetative growth. Hay mulch should cover the ground enough to shade it, but the mulch should not be so thick as to cover the ground completely. Matted or bunches of mulch shall be removed or otherwise remedied.

3.3.1.1 Temporary mulching shall be done on areas that are disturbed per 3.1.6. Hay shall be applied at a minimum of 8.0 metric tons per hectare (3.2 tons per acre) unless otherwise ordered. Blowing chopped hay mulch will be permitted provided the Contractor controls the mulching operation so as not to infringe on property owners or the traveling public. Tackifiers shall be utilized with temporary mulch.

3.3.2 In order to prevent mulch from being blown away, a light covering of loose branches or approved tackifier shall be employed. Unless otherwise ordered, loose branches shall be removed prior to Acceptance of the Work.

3.3.3 All baling wire or rope, such as that used in the shipment of mulch, shall be disposed of outside the limits of the project in approved areas.

3.3.4 Bark mulch shall be placed on the designated areas to the depth specified on the plans or as ordered.

3.3.5 On areas treated with bark mulch, the Contractor shall remove weeds and plant material as directed.

3.4 Soil Stabilization Products.

3.4.1 Surfaces of ditches and slopes to receive soil stabilization products shall conform to the grades and cross sections shown on the plans and shall be finished to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed. The soil surface shall be sufficiently loose to permit bedding of the product. Unless otherwise directed, the soil shall be prepared, including the application of lime, fertilizer and seed prior to installation of the specified type of soil stabilization product.

3.4.2 Soil stabilization of the type specified shall be installed where shown on the plans, or as directed. Throughout the entire placement area, the soil stabilization product shall be in uniform contact with the existing underlying soils and matting, if used, shall not be stretched. It is critical that this contact is achieved in order to maximize any seeding or other vegetative growth specified for this area.

3.4.3 Installation techniques and procedures shall be as recommended by the manufacturer for the particular site characteristics or as directed. Documentation from the product manufacturer regarding installation techniques and procedures shall be supplied to the Engineer at least 10 working days prior to installation.

3.4.3.1 Matting, if used, shall be buried around the edges of catch basins and other structures or obstructions as described in the manufacturer's installation requirements.

3.4.3.2 The spacing of staples may be changed as ordered, depending upon varying factors such as the season of the year or the amount of water encountered or anticipated.

3.4.4 For soil stabilization materials that become loosened, raised, or undermined, or if any matting becomes torn, or any matting staples become loose or raised, satisfactory repairs shall be made immediately.

3.5 Seed for Erosion Control.

3.5.1 Seeding, when required, shall be performed as ordered and in accordance with 644.3.

3.5.1.1 Areas of the roadside which are to be left temporarily and which will be regraded or otherwise disturbed later during construction may be ordered to be seeded with ryegrass to temporarily stabilize the area. The seed shall be sown at the rate of approximately 5 kilograms per 1000 square meters (1 pound per 1,000 square feet).

3.6 Hay bales for erosion control. Hay bales shall be placed when ordered to provide for temporary control of erosion and/ or sediment control and secured with two (2) hardwood stakes. Bales shall be removed or left in place as ordered.

3.7 Silt Fence.

3.7.1 Install and remove the silt fence as shown on the plans and as recommended by the manufacturer.

3.7.1.1 When two sections of silt fence adjoin each other, they shall be overlapped by 150 mm (6 in), folded, and stapled at a post.

3.7.1.2 Support fence, when required, shall be fastened securely to the fence posts with staples or wire ties.

3.7.1.3 Silt fence fabric shall be fastened to the support fence, when support fence is required, with ties spaced every 600 mm (2 ft) longitudinally at the top, mid-section, and bottom.

3.7.1.4 Silt fence shall be embedded a minimum of 150 mm (6 in).

3.7.2 Care shall be taken to maintain the silt fence in a functional condition at all times during the construction period.

3.7.2.1 Silt fences shall be inspected immediately after each rainfall event and at least daily during prolonged rainfall. All deficiencies shall be immediately corrected.

3.7.2.2 Sediment deposits shall be inspected after every storm event and removed when deposits reach approximately 1/3 the height of the silt fence, or when "bulges" develop in the silt fence.

3.7.2.3 Silt fence fabric which has decomposed, has become ineffective or does not retain silt or suspended solids but is still needed, shall be replaced immediately.

3.7.3 Remove the silt fence, support stakes and support fence after all work has been completed and it is no longer needed or as ordered.

3.7.3.1 Sediment deposits shall be removed or left in place, if approved. After the silt fence has been removed, sediment deposits allowed to be left in place shall be graded to conform with the existing topography and shall be vegetated.

3.7.3.2 The silt fence shall become the property of the Contractor upon completion of the project, unless otherwise ordered.

3.8 Erosion Stone.

3.8.1 Erosion stone shall be placed to provide for temporary control of erosion or sedimentation including stone check dams, inlet control and stabilized construction entrances or where ordered. Upon acceptance of the contract, the stone shall be removed as ordered.

3.9 Maintenance.

3.9.1 Erosion control features shall be maintained by the Contractor throughout the life of the project.

Method of Measurement

4.1 Mulch and temporary mulch will be measured by the square meter (square yard) or by the hectare (acre). When measurements are made by the hectare (acre), such measurements will be made to the nearest 0.01 of a hectare (acre).

4.1.1 Bark mulch will be measured by the square meter (square yard) measured along the slope of the ground.

4.2 Matting will be measured by the square meter (square yard), based on dimensions of the matting prior to installation. Areas buried or ordered overlapped will not be deducted.

4.3 Grass seed will be measured by the kilogram (pound), as specified in 644.4.1.

4.4 Hay bales for erosion control will be measured by the number of bales required.

4.5 The silt fence will be measured by the linear meter (linear foot) to the nearest one-half meter (1 foot). Measurement will be along the top of the fence for each continuous run in place.

4.6 Erosion and Sediment Control and Stormwater Management Plan will be measured as a unit. A unit will include preparation, submittals, modifications, and resubmittals.

4.6.1 Monitoring Erosion and Sediment Control will be measured to the nearest 1/2 of an hour, for the actual number of authorized hours spent monitoring the construction site(s) and off-site areas specified in 3.2.2.2 and on-site monitoring report preparation. Monitoring Erosion and Sediment Control will not be measured when there is no item for this work.

4.6.1.1 Travel time and other time not spent at the construction site(s) or off-site areas specified in 3.2.2.2 and time not authorized will not be measured.

4.7 Erosion stone will be measured per metric ton (ton) in accordance with 109.01.

Basis of Payment

5.1 The accepted quantities of erosion control work will be paid for at the contract unit price per square meter (square yard) or per hectare (acre) for mulch and per square meter (square yard) for matting, all complete in place.

5.2 Slope seed ordered for permanent erosion control and ryegrass ordered for temporary erosion control will be paid for as provided under 644.

5.3 Hay bales for erosion control will be paid for at the contract price per bale complete in place. No extra payment will be made for removal of bales ordered removed.

5.4 Tackifiers approved for use in 3.3.2 will be subsidiary.

5.5 The accepted quantity of silt fence and replacements as ordered will be paid for at the contract unit price per linear meter (linear foot) installed. No payment will be made for overlaps or splices.

5.5.1 Removing sediment deposits will be paid for under 699.

5.6 The accepted Erosion and Sediment Control and Stormwater Management Plan will be paid for at the contract lump sum price. Initial payment will be up to 75 percent of the amount bid upon approval of the Plan for the entire project. Subsequent payments will be made periodically based on the anticipated construction period.

5.6.1 Modifications and resubmittals of the Plan will be subsidiary.

5.6.2 The accepted quantities of Monitoring Erosion and Sediment Control will be paid for at the contract unit price per hour.

5.6.2.1 Travel time and other time not spent at the construction site(s) or off-site areas and support services (i.e. travel expenses, clerical staff, copying, miscellaneous expenses, overhead) will be subsidiary to Item 645.71.

5.6.3 Erosion and Sediment Control and Stormwater Management items necessary to implement and maintain the Erosion and Sediment Control and Stormwater Management Plan for the construction site(s) will be paid for under the appropriate Items of 645 or as provided under 699.5.

5.7 The accepted quantity of erosion stone will be paid for at the contract unit price per metric ton (ton) delivered to the project including any required excavation and removal, as ordered.

5.8 The Contractor shall maintain areas with permanent control, with no extra compensation, until the completion of the contract.

5.8.1 Repair and maintenance of damaged or failed slopes, until project acceptance as stated in 104.13 shall be at the expense of the Contractor.

5.8.2 The Department reserves the right to employ outside assistance or to use its own forces to provide the necessary corrective measures and deduct the cost from money due the Contractor and/ or withhold progress payments.

5.9 Erosion control measures including dust control required for stockpiles of materials subject to wind or water erosion shall be at the expense of the Contractor.

5.10 Maintenance of temporary erosion and sediment control measures will be paid under appropriate items in the contract. Removal of sediment deposits will be paid under 699.

Pay items and units:

645.111	Mulch	Square Meter (Square Yard)
645.11	Mulch	Hectare (Acre)
645.12	Temporary Mulch	Hectare (Acre)
645.15___	Bark Mulch___mm (in) Deep	Square Meter (Square Yard)
645.2	Matting for Erosion Control	Square Meter (Square Yard)
645.21	Slope Stabilization (2:1 or Flatter)	Square Meter (Square Yard)
645.22	Slope Stabilization (Steeper than 2:1)	Square Meter (Square Yard)
645.23	Channel Stabilization (Low Velocity)	Square Meter (Square Yard)
645.24	Channel Stabilization (High Velocity)	Square Meter (Square Yard)
645.25	Permanent Stabilization	Square Meter (Square Yard)
645.3	Erosion stone	Metric Ton (Ton)
645.51	Hay Bales for Temporary Erosion Control	Each
645.52	Ryegrass for Temporary Erosion Control	Kilogram (Pound)
645.531	Silt Fence	Linear Meter (Linear Foot)
645.532	Silt Fence with Support Fence	Linear Meter (Linear Foot)
645.7	Erosion and Sediment Control and Stormwater Management Plan	Unit
645.71	Monitoring Erosion and Sediment Control	Hour